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Test 893: Ford 4000 8-Speed (Diesel)

Tractor Museum
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NEBRASKA TRACTOR TEST 893 - FORD 4000 8-SPEED DIESEL

(ALSO FORD 4000 8-SPEED ROW CROP DIESEL)

POWER TAKE-OFF PERFORMANCE

Hp	Crank-shaft speed rpm	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temperature Degrees F Cooling medium	Temperature Degrees F Air wet bulb	Temperature Degrees F Air dry bulb	Barometer inches of Mercury
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed—Two Hours								
46.71	2200	3.200	0.474	14.60	194	60	78	28.960
Standard Power Take-off Speed (540 rpm)—One Hour								
41.75	1810	2.707	0.449	15.42	194	63	84	28.950
VARYING POWER AND FUEL CONSUMPTION—TWO HOURS								
41.44	2298	2.896	0.484	14.31	194	64	88	.....
0.00	2422	0.936	.....	.....	182	65	88	.....
21.37	2368	1.838	0.595	11.63	188	65	90	.....
47.30	2200	3.234	0.473	14.63	200	66	90	.....
10.81	2393	1.379	0.883	7.84	184	67	90	.....
31.58	2335	2.328	0.510	13.57	192	66	91	.....
Av 25.42	**2336**	**2.102**	**0.572**	**12.09**	**190**	**65**	**89**	**28.920**

DRAWBAR PERFORMANCE

Hp	Draw-bar pull lbs	Speed miles per hr	Crank-shaft speed rpm	Slip of drivers %	Fuel Consumption Gal per hr	Fuel Consumption Lb per hp-hr	Hp-hr per gal	Temp Degrees F Cool-ing med	Temp Degrees F Air wet bulb	Temp Degrees F Air dry bulb	Barom-eter inches of Mercury
VARYING DRAWBAR POWER AND FUEL CONSUMPTION WITH BALLAST											
Maximum Available Power—Two Hours—4th Gear											
39.35	3539	4.17	2198	5.91	3.164	0.556	12.44	195	68	88	28.540
75% of Pull at Maximum Power—Ten Hours—4th Gear											
33.57	2851	4.42	2304	4.90	2.737	0.564	12.27	191	68	81	28.555
50% of Pull at Maximum Power—Two Hours—4th Gear											
23.50	1926	4.58	2355	3.54	2.186	0.644	10.75	175	51	62	29.030
MAXIMUM POWER WITH BALLAST											
28.80	6019	1.79	2328	12.84	2nd Gear			194	68	85	28.700
39.67	5048	2.95	2200	9.52	3rd Gear			195	70	90	28.720
41.78	3788	4.14	2200	6.65	4th Gear			188	68	76	28.790
42.15	3821	4.14	2202	6.83	5th Gear			194	69	84	28.770
41.03	2306	6.67	2201	4.04	6th Gear			194	70	86	28.745
39.20	1291	11.39	2202	1.93	7th Gear			192	70	88	28.740
MAXIMUM POWER WITHOUT BALLAST											
40.50	3845	3.95	2211	11.97	4th Gear			192	56	76	28.970

VARYING DRAWBAR PULL AND TRAVEL SPEED WITH BALLAST—4th Gear

Pounds pull	3788	3983	4192	4491	4684	4813	4696
Horsepower	41.78	39.21	36.38	33.76	29.91	25.57	20.14
Crankshaft speed, rpm	2200	1973	1750	1528	1306	1090	880
Miles per hour	4.14	3.69	3.25	2.82	2.39	1.99	1.61
Slip of drivers, %	6.65	7.18	7.76	8.45	9.01	9.46	9.35

TIRES, BALLAST and WEIGHT		With Ballast	Without Ballast
Rear tires	—No, size, ply & psi	Two 14.9-30; 6; 16	Two 14.9-30; 6; 14
Ballast	—Liquid	720 lb each	None
	Cast iron	770 lb each	None
Front tires	—No, size, ply & psi	Two 7.50-16; 4; 24	Two 7.50-16; 4; 24
Ballast	—Liquid	None	None
	Cast iron	175 lb each	None
Height of drawbar		22½ inches	23 inches
Static weight	—Rear	5960 lb	2980 lb
	Front	2030 lb	1680 lb
Total weight with operator		8165 lb	4835 lb

Department of Agricultural Engineering

Dates of Test: APRIL 26 TO MAY 12, 1965

Manufacturer: FORD MOTOR COMPANY, BIRMINGHAM, MICHIGAN

FUEL, OIL and TIME Fuel No 2 diesel **Cetane No** 57.0 (rating taken from oil company's typical inspection data) **Specific gravity converted to 60°/60°** 0.8312 **Weight per gallon** 6.920 lb **Oil** SAE 10W **API service classification** DS **To motor** 1.461 gal **Drained from motor** 1.019 gal **Transmission and final-drive lubricant** Ford Oil ESN-M2C-77A **Total time engine was operated** 43 hours.

ENGINE Make Ford Diesel **Type** 3 cylinder vertical **Serial No** PD011243B5 **Crankshaft mounted** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.4" x 4.4" **Compression ratio** 16.5 to 1 **Displacement** 201 cu in **Cranking system** 12 volt electric **Lubrication** pressure **Air cleaner** oil washed wire mesh **Oil filter** replaceable cotton blend element **Fuel filter** one replaceable nylon gauze element and one replaceable paper element **Muffler** was used **Cooling medium temperature control** thermostat.

CHASSIS Type standard **Serial No** C10113 **Tread width** rear 52" to 80" front 52" to 80" **Wheel base** 84.5" **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from centerline of rear wheels 30.7" Vertical distance above roadway 29.8" Horizontal distance from center of rear wheel tread 0" to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio **Advertised speeds mph** first 1.3 second 2.1 third 3.5 fourth 4.7 fifth 4.7 sixth 7.4 seventh 12.4 eighth 16.8 reverse 2.2 and 7.7 **Clutch** single plate dry disc operated by foot pedal **Brakes** wet multiple disc operated by two foot pedals which can be locked **Steering** mechanical with power assist **Turning radius** (on concrete surface with brake applied) right 120" left 120" (on concrete surface without brake) right 138" left 138" **Turning space diameter** (on concrete surface with brake applied) right 252" left 252" (on concrete surface without brake) right 291" left 291" **Belt pulley** 1208 rpm at 2200 engine rpm diam 10.25" face 6.5" Belt speed 3241 fpm Power take-off 537 rpm at 1800 engine rpm.

REPAIRS and ADUSTMENTS No repairs or adjustments.

REMARKS All test results were determined from observed data obtained in accordance with the SAE and ASAE test code.

First gear was not run as it was necessary to limit the pull in second gear because of the stability formula. Eighth gear was not run because it exceeded 15 mph.

We, the undersigned, certify that this is a true and correct report of official Tractor Test 893.

L. F. LARSEN
Engineer-in-Charge

G. W. STEINBRUEGGE, Chairman
J. J. SULEK
D. E. LANE
Board of Tractor Test Engineers

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EXPLANATION OF TEST REPORT

GENERAL CONDITIONS

Each tractor is a production model equipped for common usage. Power consuming accessories can be disconnected only when it is convenient for the operator to do so in practice. Additional weight can be added as ballast if the manufacturer regularly supplies it for sale. The static tire loads and the inflation pressures must conform to recommendations in the Tire Standards published by the Society of Automotive Engineers.

PREPARATION FOR PERFORMANCE RUNS

The engine crankcase is drained and refilled with a measured amount of new oil conforming to specifications in the operators manual. The fuel used and the maintenance operations must also conform to the published information delivered with the tractor. The tractor is then limbered-up for 12 hours on drawbar work in accordance with the manufacturer's published recommendations. The manufacturer's representative is present to make appropriate decisions regarding mechanical adjustments.

The tractor is equipped with approximately the amount of added ballast that is used during maximum drawbar tests. The tire tread-bar height must be at least 65% of new tread height prior to the maximum power run.

BELT OR POWER TAKE-OFF PERFORMANCE

Maximum Power and Fuel Consumption. The manufacturer's representaitve makes carburetor, fuel pump, ignition and governor control settings which remain unchanged throughout all subsequent runs. The governor and the manually operated governor control lever is set to provide the high-idle speed specified by the manufacturer for maximum power. Maximum power is measured by connecting the belt pulley or the power take-off to a dynamometer. The dynamometer load is then gradually increased until the engine is operating at the rated speed specified by the manufacturer for maximum power. The corresponding fuel consumption is measured.

Varying Power and Fuel Consumption. Six different horsepower levels are used to show corresponding fuel consumption rates and how the governor causes the engine to react to the following changes in dynamometer load: 85% of the dynamometer torque at maximum power; minimum dynamometer torque, 1/2 the 85% torque; maximum power, 1/4 and 3/4 of the 85% torque. Since a tractor is generally subjected to varying loads the average of the results in this test serve well for predicting the fuel consumption of a tractor in general usage.

DRAWBAR PERFORMANCE

All engine adjustments are the same as those used in the belt or power take-off tests. If the manufacturer specifies a different rated crankshaft speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified by the manufacturer in the operating instructions.

Varying Power and Fuel Consumption With Ballast. The varying power runs are made to show the effect of speed-control devices (engine, governor, automatic transmission, etc.) on horsepower, speed and fuel consumption. These runs are made around the entire test course which has two 180 degree turns with a minimum radius of 50 feet. The drawbar pull is set at 3 different levels as follows: (1) as near to the pull at maximum power as possible and still have the tractor maintain the travel speed at maximum horsepower on the straight sections of the test course; (2) 75% of the pull at maximum power; and (3) 50% of the pull at maximum power. Prior to 1958, fuel consumption data (10 hour test) were shown only for the pull obtained at maximum power for tractors having torque converters and at 75% of the pull obtained at maximum power for gear-type tractors.

Maximum Power with Ballast. Maximum power is measured on straight level sections of the test course. Data are shown for not more than 12 different gears or travel speeds. Some gears or travel speeds may be omitted because of high slippage of the traction members or because the travel speed may exceed the safe-limit for the test course. The maximum safe speed for the Nebraska Test Course has been set at 15 miles per hour. The slippage limits have been set at 15% and 7% for pneumatic tires and steel tracks or lugs, respectively. Higher slippage gives widely varying results.

Maximum Power Without Ballast. All added ballast is removed from the tractor. The maximum drawbar power of the tractor is determined by the same procedure used for getting maximum power with ballast. The gear (or travel speed) is the same as that used in the 10-hour test.

Varying Power and Travel Speed with Ballast. Travel speeds corresponding to drawbar pulls beyond the maximum power range are obtained to show the "lugging ability" of the tractor. The run starts with the pull at maximum power; then additional drawbar pull is applied to cause decreasing speeds. The run is ended by one of three conditions: (1) maximum pull is obtained, (2) the maximum slippage limit is reached, or (3) some other operating limit is reached.

For additional information about the **Nebraska Tractor Tests** write to the **Department of Agricultural Engineering, University of Nebraska, Lincoln, Nebraska.**

Ford 4000 8-Speed Diesel